



NAVSEA 04
Building a Fall Protection
Program
16th Annual Safety Professional
Development Conference
13 Mar 2008
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Version 2008.3

Why Use Fall Protection?

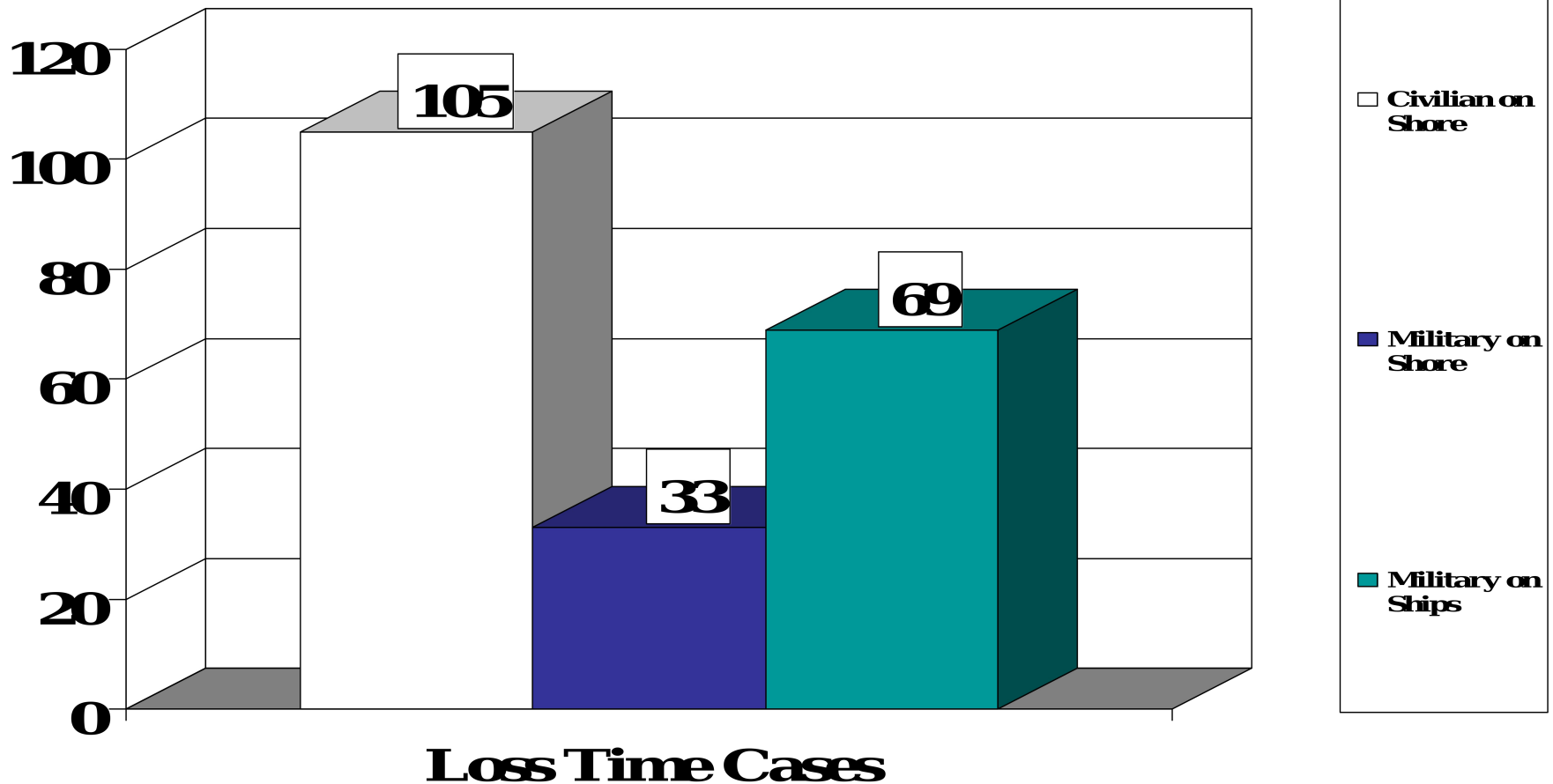
In 1995, 1,048 construction workers died on the job, with 32%, or 335 of them, resulting from falls. Each year, falls consistently account for the greatest number of fatalities in the construction industry, and are always a major concern in other industries. Events surrounding these types of accidents often involve a number of factors, including unstable working surfaces, misuse of fall protection equipment, and human error. Studies have shown that the use of guardrails, fall arrest systems, safety nets, covers, and travel restriction systems can prevent many deaths and injuries from falls.



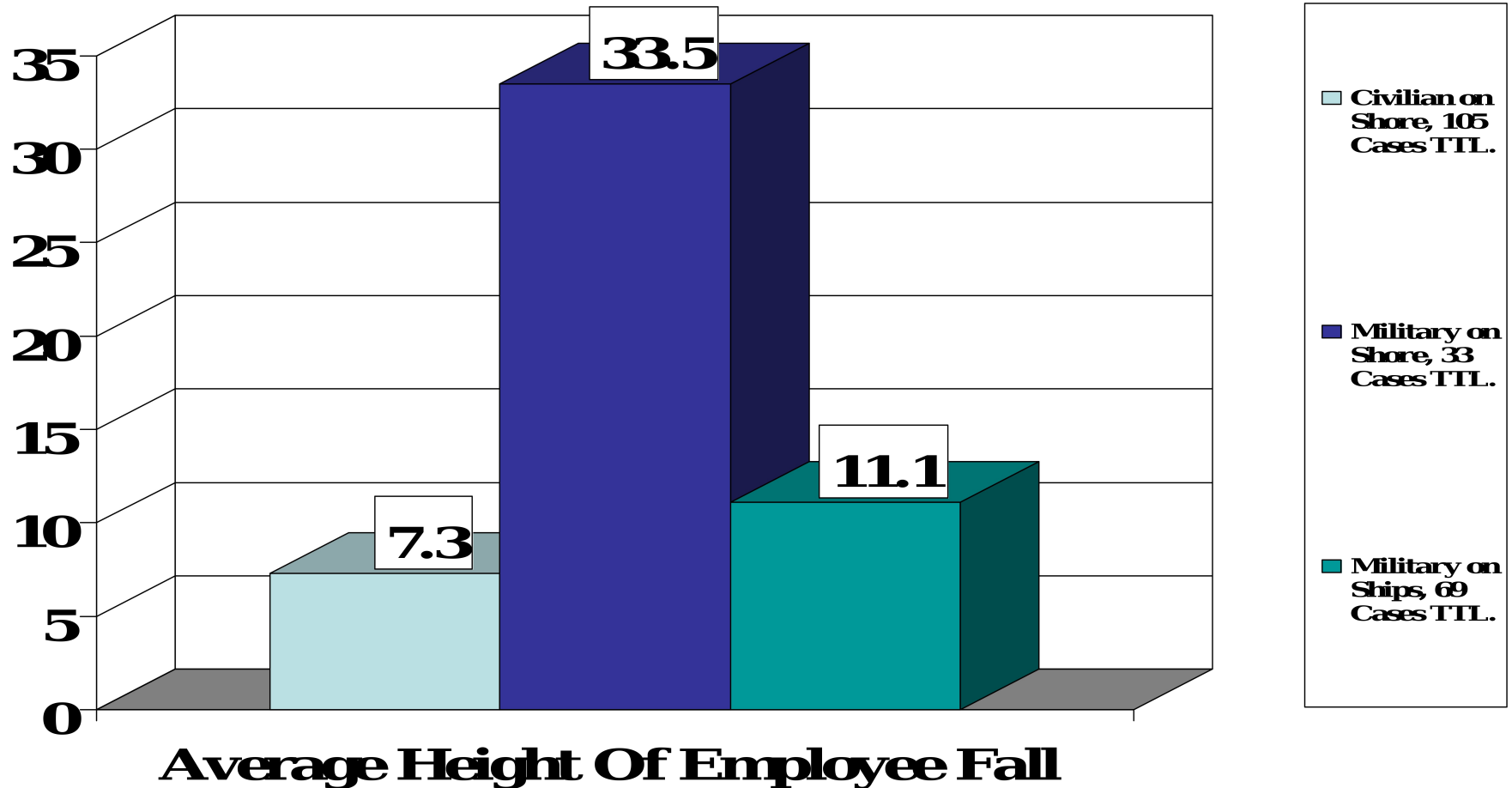
Why Use Fall Protection?

- Falls are the 2nd leading cause of death in industry.
- Navy statistics of falls demonstrate falls actually do occur!
- Required By Federal Law!
29 CFR 1910, 1915 or 1926

Navy Statistics FY 96 - FY 99



Navy Statistics FY 96 - FY 99



Types Of Fall Protection:

Traditional:

- Standard Guardrails
- Ladder Cages
- Hand rails
- Scaffolding
- Lifelines

Non Traditional

- Safety Harnesses
- Lanyards
- Carabiners
- Robe Grabs
- Self Retracting Lifelines
- Tie-Off Adapters

**Common to both methods: An Engaged
Brain is required**



Program Elements

Hazard Analysis

Equipment

Policy

Training

Inspection

Rescue

Hazard Analysis

What Equipment And Conditions Do You Already Have!

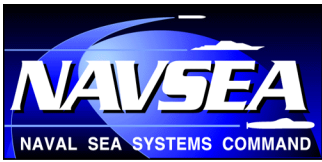
- **Qualify Equipment?**

- Condition?
- Controls?
- Usability?

- **Quantify Exposure**

- Tasks?
- Hazard?
- How Controlled?
- Is the Hazard Unique?

Are The Fall Hazards Controlled With Adequate Equipment For The Tasks Performed?



Identify the Tasks

**Those That Do The Work
Know the Tasks!**

ASK Them!!!



WHERE SHOPS USE FALL PROTECTION

- **When working 5 feet or more above a level surface.**
- **Pulling shafts, screws(props),rudders, fairplanes.**
- **On top of Conex boxes or portable buildings w/o life lines.**
- **Working on Submarine Enclosure roofs.**
- **Rigging Hull sections.**
- **Working on Hull sections.**



WHERE SHOPS USE FALL PROTECTION

- **Rigging machinery pier side, on trailers and in railcars.**
- **Attaching rigging to staging above 5 feet.**
- **Staging work above 5 feet.**
- **Removing/installing masts, antennas, waveguide, etc.**
- **Working on hulls w/ missing deck sections; no guard rails.**



WHERE SHOPS USE FALL PROTECTION

- **Working from crane suspended box or basket/cage, or JLG**
- **Working in tanks**
- **Working aboard vessels in tall compartments (Includes multi-deck shafts, high vertical ladders, deck edge elevators, hangar deck overheads, machinery space upper levels, etc.)**



WHERE SHOPS USE FALL PROTECTION

- **Rigging newly manufactured barge sections.**
- **Installing tarps on roofs, tall structures, equipment, etc.**
- **Rigging sub roofs.**
- **Working on cranes (indoors and outdoors).**



When Should You Use Fall Protection?

- 1. When working 5 feet or more above a level surface.**
- 2. Working on cranes (indoors and outdoors).**
- 3. On top of Conex boxes or portable buildings**
.
- 4. Working from crane suspended box or basket/cage**
- 5. All of the above**

Determine What Equipment is Currently Available at Your Facility.

An Example: Quantity and Quality

- 1693 Safety Belts (1094 checked out)
- 329 Harnesses (111 checked out)
- 787 Shock absorbing lanyards (324 checked out)
- 1424 Lanyards w/o Shock Absorber (995 checked out)

- No inspection criteria
- No maintenance criteria
- Majority of labels not legible
- No major replacement in 15 years



Survey the Work Force

- Use a Few Simple Questions Designed to Identify:
 - Exposure to fall hazards.
 - Effectiveness of current equipment.
- Survey can also collect data on the stature of the work force.



Results of Hazard Analysis

- Exposure to the Fall Hazards!
- The Quality of the Hazard Control.
- Suitability of Equipment.
- The probability of occurrence and the extent of regulatory compliance can be estimated.
- Use The Hazard Analysis To Determine Extent of Remaining Program Elements.



What the Hazard Analysis provides

The probability of occurrence. (i.e. a Fall)

The extent of regulatory compliance.

Exposure to fall hazards.

Data on the stature of the work force

Inspection criteria,

Maintenance criteria

Equipment Selection



Ask the Managers

- What Fall Protection Equipment do Shops need to support the tasks identified?
- Typical Answer (universal response):

**Safety Belt and Lanyard, or
Fall Protection Is Not Possible !**



The Equipment

- **Safety Harness**
- **Lanyards**
- **Heat Resistance Equipment**
- **SRL's**
- **Rope Grabs**
- **Horizontal Lifelines**
- **Ladder Climbing Devices**
- **Beamers**
- **Special Devices**

Equipment Selection:

- Evaluate each task individually.
- Determine what equipment meets the need.
- Become the expert; cause no one else is.
- Look for equipment that matches multiple tasks.
- Use all sources available to you.
 - Vendors
 - Federal Stock System
 - Manufacturers
 - Trade Shows
 - The Workers You are Trying to Protect



Now You Know:

- What the specific tasks are where employees are exposed.
- What equipment is suitable to abate the Hazard.



Qualified Person

- One with a recognized degree or certificate and with extensive knowledge and experience, capable of evaluating and developing the design, analysis, specifications, associated with the components of a Personal Fall Arrest System.



Competent Person

- One capable of identifying hazards associated with the use of Personal Fall Arrest Systems and the authority to take prompt corrective measure to eliminate hazards.

Policy



Building a Policy

- Must include applicable regulatory requirements.
- Must be simple and understandable.

AND



Building a Policy

- Must apply each of the tasks identified.
- Must be universal within your activity.
- Must be reasonable!

AND

Must be Possible!

With the equipment you identify.

- **WHEN IS FALL PROTECTION REQUIRED?**

Specific Situations:

- Aerial Work Platforms, (JLG's, Scissor Lifts)
- Ladders with Ladder Climbing Devices
- Crane Suspended Personnel Platforms

Policy (continued)

- **Rule #1: When working at heights greater than five feet and not protected by a standard guardrail.**
 - Work excluded from this rule:
 - ∇ Working from a sloping ladder (step ladder or extension ladder).
 - ∇ Climbing a fixed ladder that does not have a ladder climbing device.
 - ∇ Personnel erecting or dismantling staging (when tie-off points are not achievable).



Policy (continued)

- **Rule #2: There is no minimum job duration allowed which excludes the fall protection requirement.**
 - If a two-minute job requires 15 minutes to establish fall protection, then spend the 15 minutes!
- **Exclusion: 1st Person Up Rule:**

If a fall protection anchorage point has not previously been established, the first job of the first person exposed to the fall hazard is to establish fall protection for themselves, and all persons that follow.

Policy (continued)

- **Rule #3: There is no minimum acceptable distance from an unguarded edge*.**

- Warning systems and Safety Monitors are not allowed.
- A physical barrier, such as rope, chain, closed hatch, or closed door, which prevents employees from approaching an unguarded edge* is acceptable. Barrier tape is not considered a physical barrier.

* **Unguarded Edge: Edge with a fall hazard greater than 5 feet, not guarded by a standard guardrail or a parapet at least 34 inches high.**

Policy (continued)

- **Areas excluded from Rule #3:** Piers, Quay walls, Flooded Dry Docks - LIFE RINGS ARE STAGED and PFD requirements apply. However, working at the edge of a pier, quay wall, or flooded drydock five feet or more above a solid surface, (e.g., camel, barge, ice), requires fall protection.

Note: U-Bars placed at Submarine hatches, Shipboard accesses to tanks, voids, and similar areas are acceptable by OSHA interpretation (These are Ship's equipment items).

Note: When working on flat roofs of permanent buildings that have unguarded edges*, employees must have fall protection equipment on site and utilize the equipment when near an unguarded edge*. Pitched roofs (pitch greater than 4 inches) with unguarded edges* require fall protection at all times.

Training

- Required by OSHA
- Required by ANSI Z359.1
- Required by Manufacturers
- Required by all reasonable Competent Persons.

HOW MUCH TRAINING IS ENOUGH?



Typical Training Formats

- 2-8 hrs: Familiarization
 - 8 hrs: Fall Protection for Managers/Engineers
 - 8-16 hrs: Full User Certification.
-
- 5 Days: Competent Person Certification
 - 8 - 10 Days: Qualified Person Certification
 - 10 - 12 Days: Trainer Certification



User's Course:

- **In-House Training:**
 - Can Be Very Equipment Specific
 - Shorter Training Times
 - Least Effective
 - Training required if equipment changes
- **Commercial Courses:**
 - Usually, the Best Overall Training
 - Typically Includes Extraneous Information
 - Expensive

*For the Competent Person,
Qualified Person,
and Train the Trainer.*

Use External Training Sources

NAVOSHENVTRACEN Course A-493-0084 for

Competent Person

13 March 2008

Stewart Adams



Who Should Be Trained:

- Each User,
- Supervisors and Work Leaders
- Suitable Number of Technical/Spec Writers
- The Competent Person
 - Additional personnel, as needed
- Qualify at Least One Engineer as a “Qualified Person”
 - Or get access to one, you will need them!

Inspection



Pre-Use Inspection

- **Performed prior to each use by the User:**
 - **Webbing**
 - **Stitching**
 - **Snap hooks**
 - **Metal Components**
 - **Inspection dates**



Periodic Inspection

- Annual
- Performed by the Competent Person
 - Or by instruction from the Competent Person
 - Detailed, documented, traceable component by component.
- Most manufacturer's have guidelines.
- Specialized equipment must be returned to the manufacturer for this inspection.

Rescue

People That Use Fall Protection Equipment Fall More Often Than People That Don't!

- A Means of Rescuing an Individual, suspended after a fall is

Absolutely Crucial!



Self Rescue

- Users must be trained in what they can do to rescue themselves

and

WHAT THEY, AND OTHER EMPLOYEES MUST NOT DO!



Rescue Team

- Highly Specialized
- Beyond Knowledge of Competent and Qualified
- Emergency Personnel Usually Considered the Source

**DO NOT ASSUME YOUR FIRE DEPARTMENT
IS TRAINED AND CAPABLE OF THIS
FUNCTION!
VERIFY!**

A Few Things to Worry About



Anchorage Points:

Will They Fail During a Fall?

Should they be:

Certified and Designated?
or Improvised?

How much is 5000 pounds?



Free Fall Distance

- How Far Can You Fall and be Safe:
 - 4 Feet? (29 CFR 1910)
 - 5 Feet? (29 CFR 1915)
 - 6 Feet? (29 CFR 1910)
(29 CFR 1915)
(ANSI Z359.1)
 - 8 Feet? (29 CFR 1926)

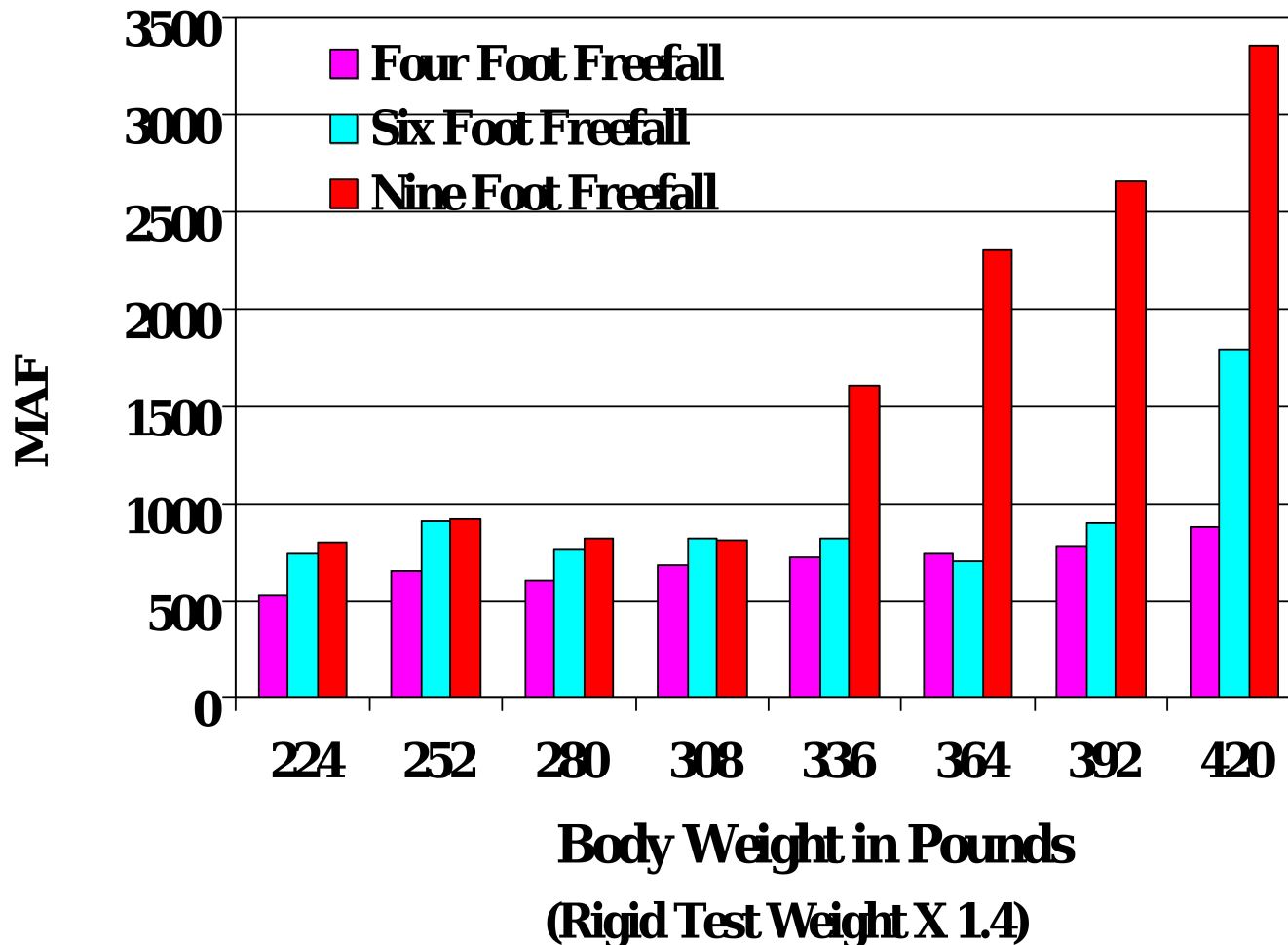


Maximum Arresting Force

- By OSHA: 1800 pounds.
- By ANSI: 900 pounds
- Injury Threshold: 2700 pounds.*
 - Based upon medical research in France and U.S.
- Comparison:
 - Opening a parachute after free fall: 2250 pounds*
 - 30 MPH head on car crash into a test barrier with a 3 point safety belt: 3000-6000 pounds*

*Fundamentals of Fall Protection; Andrew C. Sulowki; 1991

Maximum Arresting Force (MAF) Shock Absorbing Lanyard - DBI/SALA Model 3300P6





Total Fall Distance

Free Fall Distance

+

Shock Absorber Length

+

Body Length

+

Stretch

Pendulum Effect

- The velocity developed during a Vertical Free Fall can be translated into a horizontal velocity.
- Hitting a vertical wall with 800 pounds of force is same as hitting the floor with 800 pounds of force.

Rescue Time

- After approximately 30 minutes (or 10 minutes) of suspension, physiological effects become significant.
- Actual time depends upon age, health, physical condition and sex of individual.

Safety Factors for the Program Manager



Safety Factor to Injury

- Injury Force: 2700 pounds
- Regulated MAF: 1800 pounds
- Actual Arresting Force: 800-900 pounds
- Regulated Safety Factor: 1.5 : 1
- Actual Safety Factor: 3 : 1
 - Equipment and Individual dependent



Single Point Improvised Anchorage

- Capable of Supporting 5000 pounds without failure.
 - 1800 Pounds Maximum Arresting Force
 - 800 - 900 Pounds typical Actual Arresting Force
- Regulated Safety Factor - 2.7 :1
- Actual Safety Factor - 5.5 : 1
 - Equipment Specific



Engineered Single Point Anchorage

- Capable of supporting 3600 pounds without failure
 - Regulated MAF: 1800 pounds
 - Actual Arresting Force: 800 - 900
- Regulated Safety Factor: 2 : 1
- Actual Safety Factor: 4 : 1



Engineered PFAS

- Regulated Safety Factor of 2
- Actual Safety Factor - Engineer Dependent

Example: Horizontal Lifelines



Legal Stuff

Get To Know Your Activities Legal Counsel

Some Hints and Tricks

Seek Out Help!

- **Identify Those Individuals That Can Help:**

- Procurement Personnel
- Specification Writers.
- Tool Room Supervisors
- Training Personnel
- Engineering
- Union

- **Let them be part of the effort and decisions:**

- They can work in their management structure more effectively than you.

- **Don't let the issue be about compliance or money. Stay above those arguments.**
 - **Keep the issue safety of the worker for processes they perform.**
- **Acquire a set of equipment you've identified that is needed.**
- **Collect representative samples of bad stuff.**
- **Develop a short show and tell talk about the equipment.**

- **Perform this talk at every opportunity to any group greater than one that will stand in one place long enough to hear it:**
 - **All Levels of Management**
 - **Stand-up Safety Meetings**
 - **Union Meetings**
 - **Anywhere and Everywhere**

- **Encourage Workers and Supervisors to Call You.**
 - Make the set of equipment available to anyone that thinks they need it for a job or wants to try it.

- **This ones hard, cause you have to be there.**

- **Eventually (after lots and lots of work)**
- **You will not be able to handle the requests for help using the equipment you have.**
- **The result will be:**
 - Workers will be complaining they can't get the stuff they need to do their job.
 - Supervisors will begin complaining jobs are being delayed.

And Before You Know It:

It's All Your Fault!

- **Managers get involved.**
 - Allocate funding, ask the procurement personnel to buy the identified equipment Specifications are written, Training is developed (or external training identified).
- **The group of individuals that you identified**
 - all the sudden become folks with the answers in their organization.

- **There will always be naysayers.**
- Once people believe that they can do it,
 - THEY WILL DEMAND IT.

**Then, write your instruction
and
KEEP IT SIMPLE!**



And When You Are Done

Make a Difference;

Tell Your Story!